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Mediational significance of PTSD in the relationship of sexual trauma and eating disorders

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ABSTRACT

Objective: To examine the mediational significance of posttraumatic stress disorder (PTSD) and the development of eating disorder symptomatology following sexually traumatic experiences.
Method: Seventy-one victims of sexual trauma and 25 control subjects completed interviews and questionnaires assessing eating disorder psychopathology and posttraumatic stress disorder symptomatology. Mediational analyses were conducted examining the relationships among trauma, posttraumatic stress, and eating disorder symptoms. Mediational significance was assessed by the drop in the overall correlation between trauma and eating disorder symptoms when PTSD symptoms were included in the regression model.
Results: There is a significant association between a history of trauma and eating disorder symptoms. Also, there was a significant association between a history of trauma and posttraumatic stress disorder symptoms. Importantly, the relationship between trauma and eating disorder symptoms was significantly reduced when posttraumatic stress disorder symptoms were included in the regression analyses, indicating mediational significance of the posttraumatic stress construct. These findings were most pronounced for the physiological arousal and avoidance components of posttraumatic stress disorder.
Discussion: The present findings support the idea that individuals who develop eating disorders after sexual trauma are likely to have experienced posttraumatic stress disorder symptomatology. These findings have significant implications for causal models of eating disorder onset in trauma victims. Furthermore, clinical interventions for traumatized eating disordered individuals may benefit from a focus on posttraumatic stress symptomatology.

Introduction

There continue to be a significant number of empirical studies indicating that histories of childhood abuse or sexual trauma in adulthood increase the risk for disordered eating (Thompson & Wonderlich, 2004; Thompson et al., 2003; Wonderlich, Brewerton, Jocic, Dansky, & Abbott, 1997). For example, studies relying on child subjects, have typically found significant relationships between eating disorders and child abuse (e.g., Swanston, Tebbutt, O'Toole, & Oates, 1997; Wonderlich et al., 2000). Additionally, studies relying on case–control designs with adult subjects and rigorous measurement strategies to

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quantify disordered eating have also found such relationships (e.g., Welch & Fairburn, 1996; Wonderlich et al., 2001). Finally, epidemiologic studies, using large representative samples that reduce biases associated with clinical samples, have similarly found significant associations between histories of child abuse and later disordered eating (e.g., Romans, Gendall, Martin, & Mullen, 2001; Wonderlich, Wilsnack, Wilsnack, & Harris, 1996). Importantly, one recent study with adequate measurement, a large non-clinical sample of children, and a true prospective design, in which the abuse clearly preceded any eating disorder behavior, found a significant relationship between child abuse and disordered eating (Johnson, Cohen, Kasen, & Brook, 2002).

The question of how child abuse might increase the risk for an eating disorder remains unclear, although models of this relationship continue to emerge (e.g., Thompson & Wonderlich, 2004). Several variables have been studied as potential mediators of the child abuse–eating disorder relationship, including borderline personality (Waller, 1992), adverse responses to disclosure regarding the abuse (Waller & Ruddock, 1993), self-denigration (Pitts & Waller, 1993), and dissociation (Vanderlinden, Vandereycken, VanDyck, & Vertommen, 1993). Dansky et al. (Dansky, Brewerton, Kilpatrick, & O'Neill, 1997; Dansky, Brewerton, & Kilpatrick, 2000) have suggested that posttraumatic stress disorder (PTSD) is a powerful mediator of the relationship between histories of sexual assault and bulimia nervosa. Importantly, these researchers reported that in their nationally representative sample of US women, individuals who experienced sexual victimization and PTSD were more likely to meet diagnostic criteria for bulimia nervosa than victimized individuals who did not experience PTSD (Dansky et al., 1997). In another study, they reported that the relationship between bulimia nervosa and alcohol abuse/dependence might be significantly mediated by the presence of PTSD and major depression. Specifically, they reported that alcohol-related disorders were not directly associated with bulimia nervosa, but were significantly related to PTSD and major depression, which were in turn associated with bulimia nervosa (Dansky et al., 2000). Although these authors did not specify the specific mediational mechanism, there is increasing interest in the idea that eating disorder behavior may represent instrumental efforts to reduce negative affective states. In particular, negative affect following trauma may enhance the risk of developing eating disorder behaviors in trauma victims (Killgore & Yurgelun-Todd, 2006; Myers et al., 2006). Thus, there is evidence to suggest that PTSD may have mediational properties associated with sexual victimization and eating disorders, and furthermore, it may help to explain the association between eating disorders and substance use, given the previously noted relationship between affect and eating disorder behavior.

The present study was an effort to extend these previous findings and examine the mediational significance of PTSD in the child abuse–eating disorders relationship. This study is the first to use the tests by mediational significance outlined by Baron and Kenny (1986) to test the child abuse–PTSD–eating disorder relationship. Furthermore, we were interested in trying to identify which facets of PTSD such as arousal, avoidance, and re-experiencing, may be most significant in terms of mediational influence. We predicted that PTSD would be a significant mediator of the sexual trauma-eating disorder link, and specifically that the physiological arousal component of PTSD would be the most potent mediator of this relationship.

Methods

Participants

Four groups of adult women participated in the study. One hundred and two women entered the study, but five failed to complete questionnaires and are not included (total $n = 97$). One group of women had experienced sexual abuse in childhood (CSA; $n = 26$). The definition of CSA for inclusion in the study included either extrafamilial sexual activity that was unwanted or that involved a family member or other person five or more years older than the subject. The second group consisted of women who had experienced rape in adulthood (RAPE; $n = 21$). The definition of rape for inclusion in the study included forced sexual penetration upon the subject without their consent when they were 18 years of age or older (excluding marital rape). The third group consisted of women who had experienced both CSA and RAPE (CSA + RAPE; $n = 24$). The final group constituted a control group, which consisted of women who had not experienced either CSA or RAPE (control; $n = 25$). The only exclusion criterion for the study was the subject's inability to read or mental retardation.

The first three groups, CSA, RAPE, and CSA + RAPE, were recruited from clinical centers specializing in trauma related treatment and advertisements in local newspapers. Neither subjects nor any referring clinicians were aware of any specific hypotheses regarding eating disorders in the study. The control group was recruited through advertisements in local newspapers and was told that the study involved the investigation of a broad range of behaviors in women who have experienced various life circumstances. No subject was excluded as long as they met criteria for one of the four groups and could comprehend and complete the instruments.

In the present study, we were interested in examining the effect of any sexual trauma on PTSD and eating behavior. Consequently, we collapsed the CSA, RAPE, and CSA + RAPE conditions into a single sexual trauma condition which was compared to the control women who had no history of sexual trauma. Demographic information and treatment history information regarding our two groups is provided in Table 1. It is important to note that these abused or raped women were not explicitly seeking treatment for eating disorders and were in no way selected on the basis of their treatment history. It is also worth noting that both groups had high rates of pharmacotherapy, counseling or psychotherapy throughout their lives (sexual trauma = 67 (94%); controls = 20 (80%), but the groups did not differ on overall treatment history (Fisher's exact test, $p < 0.12$). Thus differences between the groups in mental health treatment cannot account for group differences or the outcome measures.

Table 1
Comparison of groups on demographic variables

	Control ($N = 25$)	Sexual trauma ($N = 71$)	Statistical test and significance
Mean age (S.D.)	37.6 (9.1)	38.1 (8.7)	$t(94) = -0.23$, p = n.s.
Marital status, N (%)			$\chi^2(5) = 6.32$, p = n.s.
Married	16 (64.0%)	29 (40.8%)	
Single	5 (20.0%)	14 (19.7%)	
Separated	1 (4.0%)	2 (2.8%)	
Divorced	2 (8.0%)	19 (26.8%)	
Widowed	0 (0.0%)	3 (4.2%)	
Cohabitating	1 (4.0%)	4 (5.6%)	
Ethnicity, N (%)			$\chi^2(3) = 0.438$, p = n.s.
White	23 (92.0%)	65 (91.5%)	
Native American	1 (4.0%)	3 (4.2%)	
Hispanic	0 (0.0%)	1 (1.4%)	
Other	1 (4.0%)	2 (2.8%)	
Education, N (%)			Gamma = −0.077, p = n.s.
<High school	0 (0.0%)	1 (1.4%)	
High school graduate	1 (4.0%)	11 (15.5%)	
Some college	8 (32.0%)	20 (28.2%)	
College degree	11 (44.0%)	19 (26.8%)	
Grad. school	3 (12.0%)	10 (14.1%)	
Other	2 (8.0%)	10 (14.1%)	
Income by group, N (%)			Gamma = −0.352, p = 0.025
<$10k	1 (4.0%)	15 (21.1%)	
$10–20k	4 (16.0%)	13 (18.3%)	
$20–30k	5 (20.0%)	10 (14.1%)	
$30–40k	3 (12.0%)	14 (19.7%)	
$40k+	12 (48.0%)	19 (26.8%)	

Measures

Eating Disorder Examination (EDE)

The EDE (Fairburn & Cooper, 1993) is a semi-structured interview used to assess current eating disorder symptoms. The EDE contains four subscales (i.e., restraint, eating concerns, shape concerns, and weight concerns) associated with core psychopathology of eating disorders, as well as frequency measures of binge eating and compensatory behaviors. For this study, additional questions, based on questions from the EDE, were asked regarding a lifetime history of eating disorder symptomatology. The validity and reliability of the EDE have been well documented and the instrument has been used extensively in studies of eating disorders (e.g., Rizvi, Peterson, Crow, & Agras, 2000; Wilson & Smith, 1989).

The Modified PTSD Symptoms Scale-Self Report (MPSS-SR)

The MPSS-SR (Falsetti, Resnick, Resick, & Kilpatrick, 1993) was employed to assess DSM-III-R symptoms criteria for PTSD. The MPSS-SR assesses both the frequency and severity of PTSD symptoms such as re-experiencing, avoidance, and arousal for the 2-week period prior to the time of administration. PTSD symptoms were identified with the use of the DSM-IV criteria for each cluster (i.e., one re-experiencing, three avoidance, and two arousal). This measure has sound psychometric properties including good internal consistency and concurrent validity. Coefficient alphas for the present study were 0.919 for arousal, 0.945 for avoidance, 0.909 for re-experiencing, and 0.969 for total score.

Procedure

Potential participants were initially screened over the phone to determine eligibility. Based on inclusion criteria, participants were subsequently placed in one of four conditions (e.g., CSA, RAPE, CSA + RAPE, control). Participants were then scheduled for a 30 min initial interview with a research staff where they provided informed consent and a 2.50 h assessment session with an assessor blind to their condition. In the initial meeting, the study was explained in detail and consent was obtained. The paper–pencil questionnaires were explained and participants were instructed to complete the questionnaires at home and mail them back upon completion. The research staff also administered the EDE Overview, both medical and psychiatric history, and EDE screening questions to the participants. Throughout the subsequent interview, which included the full EDE interview, participants were explicitly and repeatedly told not to reveal any history of childhood sexual abuse or rape to the assessor. Following completion of the interview session and questionnaires participants were reimbursed $50. This proposal was approved by the University of North Dakota Institutional Review Board.

Statistical analysis

Participants experiencing sexual trauma were compared to non-trauma participants on demographic characteristics using independent *t*-tests for continuous variables (age), chi-square for categorical variables (marital status and ethnicity), and gamma coefficients for ordered categories (education and income). Analyses of covariance were then used to compare traumatized and non-traumatized groups on MPSS-SR and EDE subscales, controlling for income (see below).

Mediational analyses were then conducted using linear regression following the recommendations of Baron and Kenny (1986). The dependent variable for these analyses was the global score from the EDE, calculated as the mean of the four subscales. The independent variable for these analyses was trauma status represented as a dummy coded indicator (1 = sexual trauma, 0 = no trauma). Mediational variables included the PTSD total score and the three MPSS-SR subscales. A three-step multiple regression analysis was performed for each mediator. At Step 1, the dependent variable was regressed on the independent variable. At Step 2, the mediator variable was regressed on the independent variable. Finally, at Step 3, the dependent variable was regressed simultaneously on the independent and mediator variables. The reduction in the regression coefficient for the independent variable from Step 1 to Step 3 served as the test of mediation.

Results

As can be seen in Table 1, there were no significant differences between the groups in age, marital status, ethnicity, or education. However, the two groups did differ in average annual income. Consequently, in all analyses presented below, annual income was entered as a covariate in the analysis.

Eating disorder and posttraumatic psychopathology

As can be seen in Table 2, trauma victims displayed significantly more eating disorder psychopathology than the control subjects. The traumatized group scored higher on the restraint, eating concern, and shape concern scales than the controls, but there were no differences in the weight concern scale.

Similarly, there was significantly more evidence of posttraumatic stress disorder symptomatology in the traumatized group than in the controls. On the PTSD total score as well as the arousal, avoidance and re-experiencing subscales of the MPSS-SR, the traumatized group scored significantly higher than control subjects.

Mediational analyses

The mediational analyses tested the general assumption that posttraumatic stress disorder, or specific aspects of posttraumatic stress disorder, would mediate the relationship between a trauma history and eating disorder behavior. Initial analyses examining the general construct of PTSD as a mediator proved to be highly significant. There was a significant association between trauma history and eating disorder behavior (Step 1; Beta = 0.28; $t(93) = 2.798$, $p = 0.006$) as well as between trauma history and PTSD ((Step 2; Beta = 0.54; $t(94) = 6.2$, $p = 0.001$). Furthermore, controlling for effects of PTSD, the relationship between trauma and eating disorder behavior was reduced markedly and was no longer significant (Step 3; Beta = 0.008; $t(92) = 0.078$, $p = 0.93$).

Similarly, mediational analyses with the arousal subscale of the MPSS demonstrated a significant association between trauma and eating disorder behavior (Step 1; Beta = 0.28; $t(93) = 2.798$, $p = 0.006$) and between trauma and arousal (Step 2; Beta = 0.70; $t(93) = 9.8$, $p = 0.001$) and when arousal was included in the statistical model, the relationship between trauma and eating disorder behavior was again reduced to negligible levels and was non-significant (Step 3; Beta = 0.006; $t(92) = 0.04$, $p = 0.97$).

In the same manner, tests of the avoidance subscale of the MPSS revealed it was a nearly perfect mediator of the trauma eating disorder relationship. Again, trauma and eating disorder behavior were significantly associated (Step 1; Beta = 0.28; $t(93) = 2.798$, $p = 0.006$) and avoidance was significantly associated with history of trauma (Step 2; Beta = 0.56; $t(93) = 6.7$,

Table 2
Comparison of Groups on MPSS-SR and EDE scales

	Control ($N = 25$)	Sexual trauma ($N = 71$)	$F(1, 93)$	Significance level ($p<$)
MPSS-SR (*M*, S.D.)				
Arousal	1.72 (1.51)	4.41 (0.95)	96.4	0.001
Avoidance	1.56 (1.73)	4.89 (2.06)	45.3	0.001
Re-experiencing	2.16 (2.03)	4.08 (1.28)	29.6	0.001
Total score	19.88 (18.58)	74.44 (39.46)	38.5	0.001
EDE (*M*, S.D.)				
Restraint	0.84 (1.14)	1.70 (1.50)	6.5	0.012
Eating concern	0.12 (0.22)	0.83 (1.23)	7.0	0.010
Shape concern	2.00 (1.73)	3.05 (1.77)	5.7	0.018
Weight concern	2.12 (1.62)	2.96 (1.73)	3.6	0.059

$p = 0.001$) and the magnitude of the association between trauma and eating disorders was significantly reduced when avoidance was entered in the mediational model (Step 3; Beta = 0.05; $t(92) = 0.05$, $p = 0.69$). The re-experiencing subscale of the MPSS failed to show such significant mediation. Although it was significantly associated with trauma (Step 2; Beta = 0.50; $t(93) = 5.4$, $p = 0.001$), the magnitude of the relationship between trauma and eating disorders was reduced less significantly, from 0.28 to 0.17 (Step 3; Beta = 0.17; $t(92) = 1.5$, $p = 0.12$).

Finally, in an effort to clarify whether or not specific trauma histories, represented by the three different trauma groups, may have different mediational pathways, we conducted the same series of mediational analyses separately for each of the trauma groups. This allowed us a specific and rigorous test to determine whether or not collapsing our three separate trauma groups into one trauma group for the mediational analyses was warranted. Each separate mediational analysis involved 27 measures of association between independent variables, mediators, and dependent variables. Of the 27 measures of association tested in this series of three separate mediational analyses, 25 were significant at the same level as in our overall-combined analysis and all of the directions of association of the variables remained the same. Thus, we believe our primary analysis, involving collapsing the three trauma groups into one group, provides no loss of information and offers a more parsimonious analysis of the data than separate analyses.

Discussion

Consistent with our predictions and past research, we found that histories of trauma were associated with increased eating disorder psychopathology and increased symptoms of posttraumatic stress disorder. Most importantly, however, the present findings indicated that PTSD was a significant and powerful mediator of the relationship between sexual trauma and disordered eating. Furthermore, as predicted, physiological arousal appeared to be a particularly potent component of this mediation, along with social avoidance.

One possible interpretation of these findings is that those individuals who develop eating disorders after sexual trauma are particularly likely to display significant PTSD symptomatology. Similar to the findings of Dansky et al. (1997) and Dansky, Byrne, and Brady (1999) PTSD may be seen as the natural consequence of such trauma and, furthermore, eating disorder symptoms may help victims to manage aversive emotional arousal associated with PTSD. Previous studies have suggested that binge eating, for example, may serve as a powerful means of avoiding negative affect (Heatherton & Baumeister, 1991). Consequently, a reasonable conceptual explanation of our findings is that in those traumatized individuals who develop PTSD, and particularly high levels of arousal, may be most likely to develop eating disorder symptomatology, perhaps as an effort to regulate underlying emotional states. Similarly, the significant social avoidance and withdrawal following sexual trauma may also increase the likelihood of eating disorder symptomatology, both as a means of dealing with social isolation, but also the negative affect associated with such isolative experiences.

The present findings may have implications for the treatment of eating disordered individuals with sexual trauma histories. First line psychotherapeutic treatments for eating disorders often include substantial cognitive behavioral interventions, which target issues related to food, shape, and weight. While such interventions may be appropriate for eating disordered individuals without sexual trauma histories, they may neglect important physiological arousal components of the psychopathology in the sexual trauma survivor. The treatment of such individuals may need to address underlying emotional responses, particularly as they are related to trauma. There has been an increased emphasis in eating disorder treatment on emotional responding and recent eating disorder treatments more explicitly targets such emotional factors (e.g., Safer, Telch, & Agras, 2001). However, eating disordered individuals with sexual trauma and associated PTSD may require treatments that are more explicitly focused on sexual trauma (e.g., which simultaneously address potentially self-damaging behaviors like starvation, bingeing and purging).

The present study is limited by its cross-sectional nature. In the absence of longitudinal data, we cannot be assured that PTSD symptomatology serves as an actual mediator between sexual trauma and eating disorder behavior. The temporal order of these events cannot be deciphered in such a cross-sectional design, and consequently strong causal inferences should be tempered. On the other hand, this study is strengthened by a large sample of victims, who were not selected for any particular psychopathology, and rigorous assessment of eating disorder behavior, and posttraumatic symptomatology. Future studies could enhance the present findings through longitudinal designs, which clarify issues of temporal order, and also a more rigorous interview-based assessment of PTSD.

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